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Here t must be reckoned from 1894·0, and the correction must be zero. Thus his theory gives two inconsistent corrections to the same numbers.

Note on Professor Newcomb's Remarks. By E. J. Stone, M.A., F.R.S., Radcliffe Observer.

Professor Newcomb's attempt to disprove my views by a *reductio ad absurdum* will be found to rest upon an interesting example of the very common logical fallacy of a *petitio principii.*

I have proved, or at least profess to have proved, in the *Monthly Notices*, vol. liv., that, with the two independent systems of time-measurement adopted in practical astronomical work, the tabular right ascensions, α^s, for the transits over an observer's meridian at the time $r+\delta r$ can only be accurately found from the equation

$$(1) \qquad \alpha^s = \phi\,(r+\delta r) = \phi\,(r) + \frac{d\,.\,\phi\,(r)}{dt}\left[\frac{\alpha^s - A_r{}^{s\prime} - \delta l^s - 86400^s\,.\,xr}{24^h\left(1 + \frac{N}{2\pi} + x\right)}\right] + \&c.,$$

where $\phi(r)$ is the tabular right ascension computed directly from the tables for the time $t=r$; $A_r{}^{s\prime}$ the "local sidereal time at mean noon," computed for the time $t = r$, from a set of solar tables adopted for this purpose, and also used to fix the time at which in each year the Sun's mean longitude is equal to 280° ; the corrections δl^s and x are quantities whose magnitudes depend upon the differences between the constants l and N, adopted for the epoch constant and mean motion of the Sun per "unit day" in the formation of the solar tables employed, and certain definite constants l_0 and N_0, which, if they had been adopted instead of l and N, would have rendered the corrections δl^s and x zero. These corrections, δl^s and x, necessarily change with the adoption of different values of l and N in our solar tables.

Now Professor Newcomb, undoubtedly following the usual course, determines certain quantities $\alpha_{\prime}{}^s$ from the equation

$$(2) \qquad \alpha_{\prime}{}^s = \phi\,(r) + \frac{d\,.\,\phi\,(r)}{dt}\left[\frac{\alpha_{\prime}{}^s - A_r{}^{s\prime}}{24^h\left(1 + \frac{N}{2\pi}\right)}\right] + \&c.,$$

and calls the results thus obtained the tabular right ascensions at the meridian transits.

But if the equation (1) is exact, the equation (2) is inexact, and *vice versâ.*

It is therefore simply begging the question to assume, without proof, that the values of $\alpha_{\prime}{}^s$ found from the equation (2) are the correct tabular right ascensions at the meridian transits, and not the values α^s found from the equation (1).

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If Professor Newcomb can *prove* that with the dual systems of time-measurement in use in practical astronomical work the equation (1) is inexact and (2) is exact, then there is an end of my explanation of the cause of the change of the residual differences (Tabular R.A. from Hansen—Observed R.A. of Moon) about the year 1864, which is evident when the quantities $\alpha_{\prime}^{s}$ computed from the equation (2) are adopted as the tabular right ascensions for the meridian transits. But, on the other hand, if my proofs of the equation (1) are sound, the explanation of this *per saltum* change is shown conclusively to result from the differences between the quantities $\alpha^{s} - \alpha_{\prime}^{s}$ before and after 1864, which directly result from the different values of the constants l and N employed in the formation of the solar tables in use before and after 1864.

The discussion of the residuals (Hansen—Observed) is not appealed to as a proof of the truth of the equation (1), which must be, and has been, independently proved; but it is certainly no disproof to show that if we neglect the corrections $\delta l^{s} + 86400^{s} \,.\, xr$ and use the quantities $\alpha_{\prime}^{s}$ for the tabular right ascensions at the meridian transits of the Moon, the residuals which should remain sensibly unchanged about 1864, if the neglect of these corrections is a legitimate one, are found to have changed to such an extent that the same mean motions will not represent the observations before and after that date, and that these *per saltum* changes disappear when the tabular right ascensions are computed from equation (1).

Tables to Facilitate the Application of Gauss's Method of Computing Secular Variations. By R. T. A. Innes.

In Vol. I. of Newcomb's Astronomical Papers of the American Ephemeris, Professor G. W. Hill suggested the computations of the functions $\chi(\tau)$ and $\psi(\tau)$, both functions of θ.

If we take another function a related to θ as follows:—

$$\frac{1-a}{1+a} = \sqrt{\frac{\cos\left(60^{\circ} + \frac{\theta}{3}\right)}{\cos\frac{\theta}{3}}}\,.$$

M. O. Callandreau has published tables to six places of $\log m^{4} n^{4} \chi(\tau)$ and $\log \frac{\psi(\tau)}{\chi(\tau)}$ in vol. xviii of *Les Annales de l'Observatoire de Paris* for 580 values of a from 0·000 to 1·000, its extreme limits.

I had, previously to seeing M. Callandreau's tables, com-

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